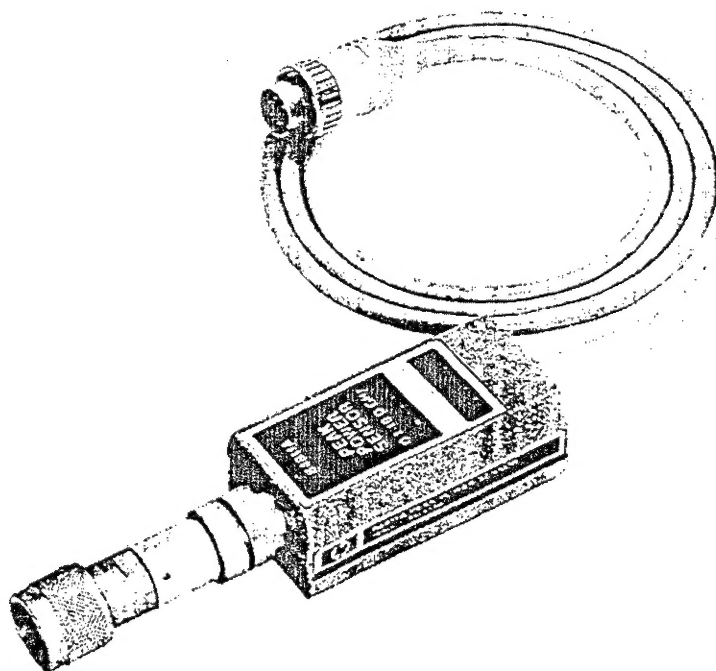


# OPERATING AND SERVICE MANUAL

## HP 84811A PEAK POWER SENSOR



HP Part No. 84811-90010



HEWLETT  
PACKARD

## CERTIFICATION

*Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, (NIST), to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.*

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## ASSISTANCE

*Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.*

*For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.*

# HP 84811A PEAK POWER SENSOR

## SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 2131A and above.

For additional important information about serial numbers, see INSTRUMENTS COVERED BY MANUAL on Page 2.



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## GENERAL INFORMATION

### Introduction

This Operating and Service Manual contains information about initial inspection, performance tests, adjustments, operation, troubleshooting and repair of the HP 84811A Peak Power Sensor.

On the title page of this manual is a "Microfiche" part number. This number can be used to order a 4 x 6-inch microfilm transparency of the manual.

### Specifications

Instrument specifications are listed in Table 1. These specifications are the performance standards or limits against which the instrument is tested.

Table 1. Specifications\*

Power range: 0 to +20 dBm (1 mW to 100 mW).
Frequency range: 100 MHz to 18 GHz.
SWR: 100 MHz to 12 GHz <1.5, 12 GHz to 18 GHz <2.0.
Maximum Peak Power: +24 dBm (250 mW) for 5 min.
Connector type: N(male).
Calibration: every 2 GHz from 2 to 10 GHz, every 1 GHz from 11 to 18 GHz.
Operating temperature: 0 to +55°C.
Calibration accuracy: (+10 to +40°C). ±0.7 dB 0.1 to 12 GHz, ±1.0 dB 12 to 18 GHz.
0—10°C and 40—55°C: add ±0.2 dB.
General:
Dimensions: 30 mm H x 38 mm W x 140 mm L (1.2 x 1.5 x 5.5 inches).
Weight: 0.5 kg, (1 lb.) net.
Sensor cable length: 1.2 metres (4.1 ft).

\*Specifications only apply in combination with specifications of HP 8900C/D peak power meters.

### Instruments Covered by Manual

This instrument has a two-part serial number. The first four digits and the letter are the serial number prefix. The last five digits form a sequential suffix which is unique to each instrument. The contents of this manual apply directly to instruments having the serial number prefix listed under SERIAL NUMBERS on the title page.

An instrument manufactured after the printing of this manual may have a serial number prefix that is not listed on the title page. This unlisted serial number prefix indicates that the manual for this

instrument is supplied with a Manual Changes supplement that documents the differences.

In addition to change information, the supplement may contain information for correcting errors in the manual. The supplement for this manual is keyed to this manual's print date and part number, both of which appear on the title page.

For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

### Description

The HP 84811A is a Peak Power Sensor. With a compatible peak power meter it measures power levels in a range from 0 to +20 dBm (1 mW to 100 mW), and at frequencies from 100 MHz to 18 GHz. Compatible meters are the HP 8900C and HP 8900D Peak Power Meters.

### CAUTION

*The HP 84811A Peak Power Sensor has a maximum peak power rating of +24 dBm (250 mW). Maintaining an input power level of 250 mW for longer than five (5) minutes or exceeding the maximum peak power rating may cause severe component damage.*

### NOTE

*The diode (U1) is easily replaceable. Hewlett-Packard recommends that replacement diodes be kept as spares if the HP 84811A is used in applications where inadvertent high power overload might occur.*

*For instructions on disassembly and reassembly of the HP 84811A, refer to the service section of this manual.*

### Recommended Test Equipment

Table 2 lists the test equipment recommended to check, adjust, and troubleshoot the Peak Power Sensor. If substitute equipment is used, it must meet or exceed the critical specifications.

Table 2. Recommended Test Equipment

Instrument Type	Critical Specifications	Suggested Model
Peak Power Meter	Compatibility with Peak Power Sensor	HP 8900C
Digital Voltmeter	Resolution = at least 0.0001 Vdc; Range = $\pm 1.5$ Vdc	HP 3455A
Power Supply	Regulation —load effect 5 mV, source effect 3 mV. Range: 0—1.5 V min. Periodic and random deviation: 200 $\mu$ Vrms, 1 mV peak to peak	HP6203B
Potentiometer	Non-wirewound 50 Ohm. 1/4 Watt	HP 2100-0671
Sweep Oscillator		HP 8620C
Mainframe		
RF Plug-in		HP 86290A
Microwave Amplifier		HP 489A, 491C, 493A, 495A
Coaxial Step Attenuator	1 dB/step	HP 8494B
Dual Directional Coupler		HP 11692D
Power Meter (2 required)		HP 436A
Power Sensor (2 required)	Compatibility with HP 436A Power Meter	HP 8481A
Coaxial Attenuator	20 dB	HP 8491B Opt. 010
Type N Coaxial Short		HP 11512
Type N Coaxial Open (made from the following parts):		HP 1250-0916, Body HP 1250-0016 Snap Ring HP 1250-0918 Nut

## INSTALLATION

### Initial Inspection

Inspect the shipping container for damage. If the shipping container or packaging material is damaged, it should be kept until the contents of the shipment have been checked mechanically and electrically. If there is mechanical damage or if the instrument does not pass the performance tests, notify the nearest Hewlett-Packard office. Keep the damaged shipping materials (if any) for inspection by the carrier and a Hewlett-Packard representative.

### Preparation for Use

**Interconnections.** The Peak Power Sensor and the peak power meter are integral parts of a measurement system. Before measurements can be performed, the peak power meter and Peak Power Sensor must be connected.

**Mating Connectors.** The rf input of the Peak Power Sensor can only be connected to a 50 ohm type N female connector that is compatible with US MIL-C-39012.

### Operating Environment

The operating environment for the Peak Power Sensor should be within the following limits:

Temperature: 0 to +55°C  
Relative humidity: less than 95% at 40°C  
Altitude: less than 4600 metres (15 000 ft).

### Storage and Shipment

**Storage Environment.** The instrument should be stored in a clean, dry environment. The following limitations apply to both storage and shipment:

Temperature: -40 to +75°C  
Relative humidity: less than 95% at 40°C  
Altitude: less than 15 300 metres (50 000 ft).

### Storage and Shipment (cont'd)

**Original Packaging.** Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing, attach a blue tag (found at the end of this manual) indicating the type of service required, return address, model number, and serial number. Also, mark the container **FRAGILE** to assure careful handling. In any correspondence, refer to the instrument by model number and serial number.

### OPERATION

#### WARNING

*BEFORE CONNECTING THE PEAK POWER SENSOR TO OTHER INSTRUMENTS, ensure that all instruments are connected to the protective (earth) ground. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in personal injury.*

### Correction Factor

Before taking a measurement, find the correction factor on the label attached to the Peak Sensor cover. Find the correction factor that is associated with the frequency of the measurement. The correction factor for 2 GHz applies to frequencies from 100 MHz to 2 GHz. Enter the data into your HP 8900C or 8900D peak power meter.

#### NOTE

*Correction Factor data and Calibration Factor data are not the same. Correction Factor data must be set on the power meter before the measurement. That is, the measured value cannot be corrected mathematically afterwards based on this data.*

### Operating Instructions

Once the Peak Power Sensor has been attached to the power meter and the Correction Factor has been set, the power meter is ready to take a reading. For more information on operating the power meter, refer to the operating instructions in the power meter operating and service manual.

### RETURN LOSS PERFORMANCE TEST

**Specification**      SWR: 100 MHz to 12 GHz <1.5  
                             12 GHz to 18 GHz <2.0

**Description**      To verify SWR specifications a Return Loss Test is performed. The Return Loss Test may be run without the Peak Power Sensor being connected to the Peak Power Meter. A microwave source is connected by appropriate attenuation to a dual directional coupler. The Peak Power Sensor is connected to the test port of the directional coupler. The incident and reflected ports of the directional coupler are connected to power meters. From the power measurements made on the incident and reflected ports, Return Loss can be calculated.

**Equipment**

Sweep Oscillator Mainframe .....	HP 8620C
RF Plug-in .....	HP 86290A
Microwave Amplifier .....	HP 489A, 491C, 493A, 495A
Coaxial Step Attenuator (1 dB/step) .....	HP 8494B
Dual Directional Coupler .....	HP 11692D
Power Meter (2 required) .....	HP 436A
Power Sensor (2 required) .....	HP 8481A
Coaxial Attenuator (10 dB) .....	HP 8491B Opt. 010
Type N Coaxial Short .....	HP 11512A
Type N Coaxial Open	
(made from the following parts): .....	HP 1250-0916 Body,
	HP 1250-0016 Snap Ring,
	HP 1250-0918 Nut

## RETURN LOSS PERFORMANCE TEST (cont'd)

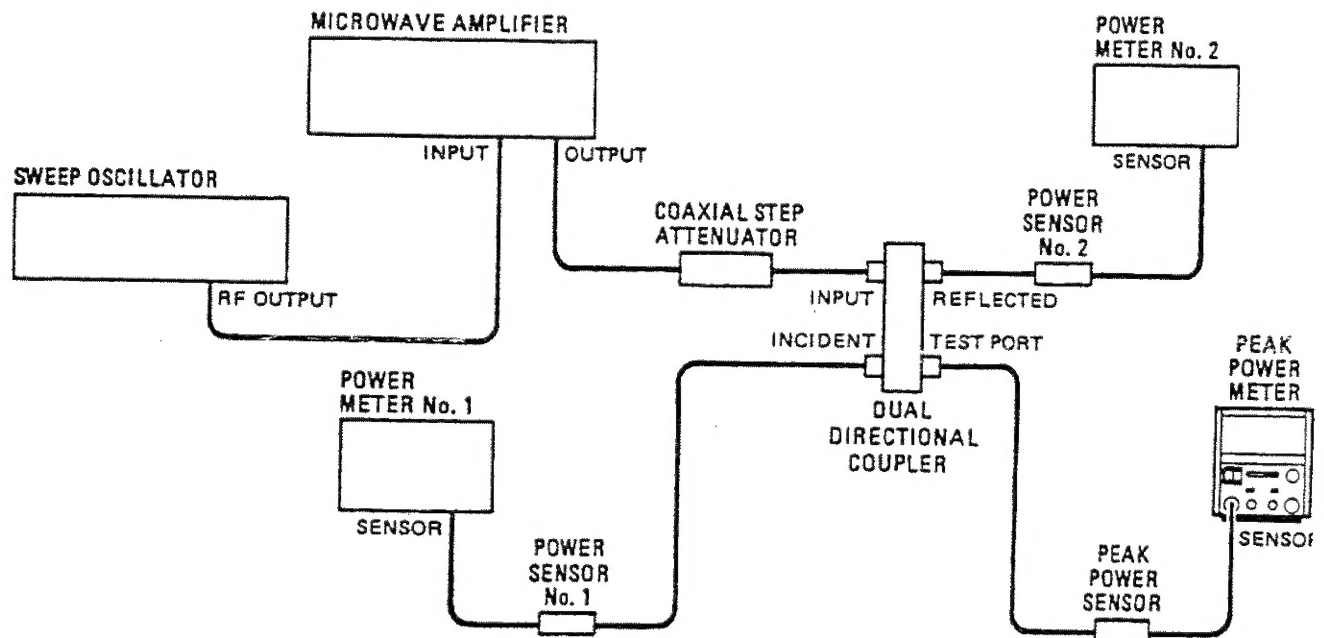


Figure 1. Return Loss Performance Test Setup

## NOTES

*Use the appropriate microwave amplifier depending on the frequency of interest.*

*The type N coaxial open is required only for measurements above 10 GHz.*

## Procedure

1. Set the coaxial step attenuator to 11 dB of attenuation. Connect the equipment as shown in Figure 1. Allow at least one half hour for the equipment to warm up. Then before doing the performance test, be sure the test port output of the coupler is less than 100 mW.

2. Set the sweep oscillator to CW, and set to the frequency of interest. Make sure that the microwave amplifier is compatible with the frequency of the sweep oscillator.

Frequency of interest \_\_\_\_\_

3. Using the 10 dB coaxial attenuator connected to the test port of the dual directional coupler, measure the power output with power meter #2. Adjust the sweep oscillator and/or the microwave amplifier for +10 dBm at the attenuator output. Read and record the power level of power meter #1. This value is the incident wave reference level. Remove the attenuator and connect power meter #2 to the reflected port of the dual directional coupler.

Power Meter #1 (Incident Wave Reference Level) \_\_\_\_\_

4. Terminate the test port of the dual directional coupler with a type N open constructed from the parts listed in the equipment list. It is not necessary to use this

## RETURN LOSS PERFORMANCE TEST (cont'd)

non-radiating open if operating below 10 GHz. Readjust the source so that the reading on power meter #1 is equal to the incident wave reference level measured in step #3. Measure and record the power level using power meter #2, at the reflected port.

Power Meter #2 (reflected port) \_\_\_\_\_

5. Terminate the test port with a type N coaxial short. Readjust the source so that the reading on power meter #1 is equal to the incident wave reference level measured in step #3. Measure and record the power level at the reflected port as in the previous step.

Power Meter #2 (reflected port) \_\_\_\_\_

6. Compute the average power measured on power meter #2 in steps 4 and 5 above. This value is the return loss reference.

Return loss reference \_\_\_\_\_

7. Connect the Peak Power Sensor and Peak Power Meter to the test port. Using power meter #1, monitor the power level at the incident port and adjust to the same level as in step 3 if necessary.

8. Read and record the power level indicated on power meter #2.

Power Meter #2 \_\_\_\_\_

9. Determine and record the maximum error of the test system using the following data:

Test Frequency	Error
100 MHz to 8 GHz	1.5 dB
8 GHz to 12 GHz	2.1 dB
12 GHz to 18 GHz	1.4 dB

Error \_\_\_\_\_ dB

10. Compute the return loss for D.U.T. using the following formula.

(Power Meter #2 reading — step 8) \_\_\_\_\_

— (Return Loss Reference — step 6) \_\_\_\_\_

+ (Maximum Error of test system — Step 9) \_\_\_\_\_

Return Loss of D.U.T. \_\_\_\_\_

For frequencies between 100 MHz and 12 GHz return loss for D.U.T. must be > 14 dB (or < 1.5 SWR).

For frequencies between 12 GHz and 18 GHz the return loss for D.U.T. must be > 9.55 dB (or < 2.0 SWR).



## REPLACEABLE PARTS

Table 3 is a list of replaceable parts. Figure 3 is the illustrated parts breakdown (IPB) that identifies the major assemblies and chassis parts. The mounting locations of the components on the A1 Input Amplifier Assembly are shown in Figure 4. To order a part, quote the Hewlett-Packard part number and Check Digit (CD), specify the quantity required, and address the order to the nearest Hewlett-Packard office (see NOTE below). To order

a part not listed in Table 3, give the instrument model number, instrument serial number, the description and function of the part, and the quantity of parts required.

### NOTE

*Within the USA, it is better to order directly from the HP Parts Center in Mt. View, California. Ask your nearest HP office for information and forms for the "Direct Mail Order System".*

Table 3. Replaceable Parts

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Manufacturer Part Number
A1	84811-60101	1	1		INPUT AMPLIFIER BOARD ASSEMBLY	28480	84811-60101
	3030-0422	8			SCREW-SKT HD CAP 0-80 .188 IN-LG SST-302 (USED TO MOUNT THE A1 ASSEMBLY)	28480	3030-0422
A1C1	0160-0576	5	2		CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C2	0160-0576	5			CAPACITOR-FXD .1UF +-20% 50VDC CER	28480	0160-0576
A1C3	0160-4526	3	1		CAPACITOR-FXD 42PF +-5% 200VDC CER 0+-30	28480	0160-4526
A1C4	0160-4491	1	1		CAPACITOR-FXD 8.2PF +-5% 200VDC CER	28480	0160-4491
A1CR1	1901-0050	3	2		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR2	1901-0050	3			DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1902-0050
A1J1	84811-80002	3	1		CONTACT-FINGER	28480	84811-80002
A1L1	9100-2256	5	1		INDUCTOR RF-CR-MLD 560MH 10% .105DX.26LG	28480	9100-2256
A1Q1	1854-0457	3	2		TRANSISTOR-DUAL NPN PD=400MW	28480	1854-0457
A1Q2	1854-0457	3			TRANSISTOR-DUAL NPN PD=400MW	28480	1854-0457
A1Q3	1854-0345	8	1		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A1Q4	1854-0477	7	1		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0698-7210	7	1		RESISTOR 82.5 1% .05W F TC=0+-100	24546	C3-1/8-TO-82R5-F
A1R2	0698-7228	7	1		RESISTOR 464 1% .05W F TC=0+-100	24546	C3-1/8-TO-464R-F
A1R3	0698-7268	5	1		RESISTOR 21.5K 1% .05W F TC=0+-100	24546	C3-1/8-TO-2152-F
A1R4	0698-7239	0	1		RESISTOR 1.33K 1% .05W F TC=0+-100	24546	C3-1/8-TO-1331-F
A1R5	0698-7231	2	1		RESISTOR 619 1% .05W F TC=0+-100	24546	C3-1/8-TO-619R-F
A1R6	2100-2216	0	1		RESISTOR-TRMR 5K 10% C TOP-ADJ 1 TRM	73138	82PR5K
A1R7	0698-7248	1	1		RESISTOR 3.16K 1% .05W F TC=0+-100	24546	C3-1/8-TO-3161-F
A1R8	2100-1986	9	1		RESISTOR-TRMR 1K 10% C TOP-ADJ 1-TRM	73138	81PR1K
A1R9	0698-7229	8	1		RESISTOR 511 1% .05W F TC=0+-100	24546	C3-1/8-TO-511R-F
A1R10	0698-7216	3	1		RESISTOR 147 1% .05W F TC=0+-100	24546	C3-1/8-TO-147R-F
A1R11	0698-7235	6	1		RESISTOR 909 1% .05W F TC=0+-100	24546	C3-1/8-TO-909R-F
A1R12	0698-7242	5	1		RESISTOR 1.78K 1% .05W F TC=0+-100	24546	C3-1/8-TO-1781-F
A1R13	0757-0394	0	1		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-51R1-F
A1R14	0698-7205	0	1		RESISTOR 51.1 1% .05W F TC=0+-100	24546	C3-1/8-TO-51R1-F
A1R15	0757-0402	1	1		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-TO-111-F
A1RT1	0837-0180	2	1		THERMISTOR 1K-OHM	01295	TSP102J
J1	84811-60004	3	1		RF CONNECTOR - REPLACEMENT ASSEMBLY (INCLUDES U2 ONLY)	28480	84811-60004
MP1	84811-20006	1	1		WASHER-CAP	28480	84811-20006
MP2	7121-1514	8	1		LABEL-INFO (CAUTION) 84811A	28480	7121-1514
MP3	08481-40002	9	2		SHELL-PLASTIC	28480	08481-40002
MP4	08481-40002	9			SHELL-PLASTIC	28480	08481-40002
MP5					NOT ASSIGNED		
MP6					NOT ASSIGNED		
MP7	08481-20011	8	2		CHASSIS	28480	08481-20011
MP8	08481-20011	8			CHASSIS	28480	08481-20011
MP9	08481-00002	5	2		SHIELD	28480	08481-00002
MP10	08481-00002	5			SHIELD	28480	08481-00002
MP11	2950-0043	8	1		NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
MP12	2190-0016	3	1		WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
MP13	5021-0801	0	1		POLYIRON-RING	28480	5021-0801
MP14-MP25	3030-0954	9	8		SCREW-SET 1/4-20 2-IN-LG CUP-PT STL	28480	3030-0952
		8	4				
MP26	84811-20002	7	1		END CAP	28480	84811-20002
MP27	84811-20001	6	1		OUTPUT COVER	28480	84811-20001
MP28	7121-2422	9	1		LABEL-WARNING .315-IN-WD 2.745-IN-LG AL	28480	7121-2422
MP29	84811-80003	4	1		LABEL-ID	28480	84811-80003
MP30	08486-80001	7	1		LABEL CAL FACTOR (BLANK)	28480	08486-80001
MP31	08481-80005	6	1		MYLAR (COVERS CF LABEL)	28480	08486-80005
MP32	08486-80005	1	1		LABEL INFO (SIDE)	28480	7120-2422
MP33	7120-2422	7	1		LABEL-WARNING (SIDE)	28480	7120-2422
U1	84811-60003	2	1		DIODE MODULE-REPLACEMENT ASSEMBLY	28480	84811-60003
U2	84811-60005	4	1		REPLACEMENT DC BLOCK ASSEMBLY (PART OF J1)	28480	84811-60005
W1	8120-1788	7	1		CABLE ASSEMBLY (NON-REPAIRABLE)	28480	8120-1788

Table 4. Code List of Manufacturers

Mfr Code	Manufacturer Name	Address	Zip Code
0000L	ANY SATISFACTORY SUPPLIER		
01295	TEXAS INSTR INC SEMICONO CMPNT DIV	DALLAS TX	75222
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
73138	BECKMAN INSTRUMENTS INC MELIPOT DIV	FULLERTON CA	92634

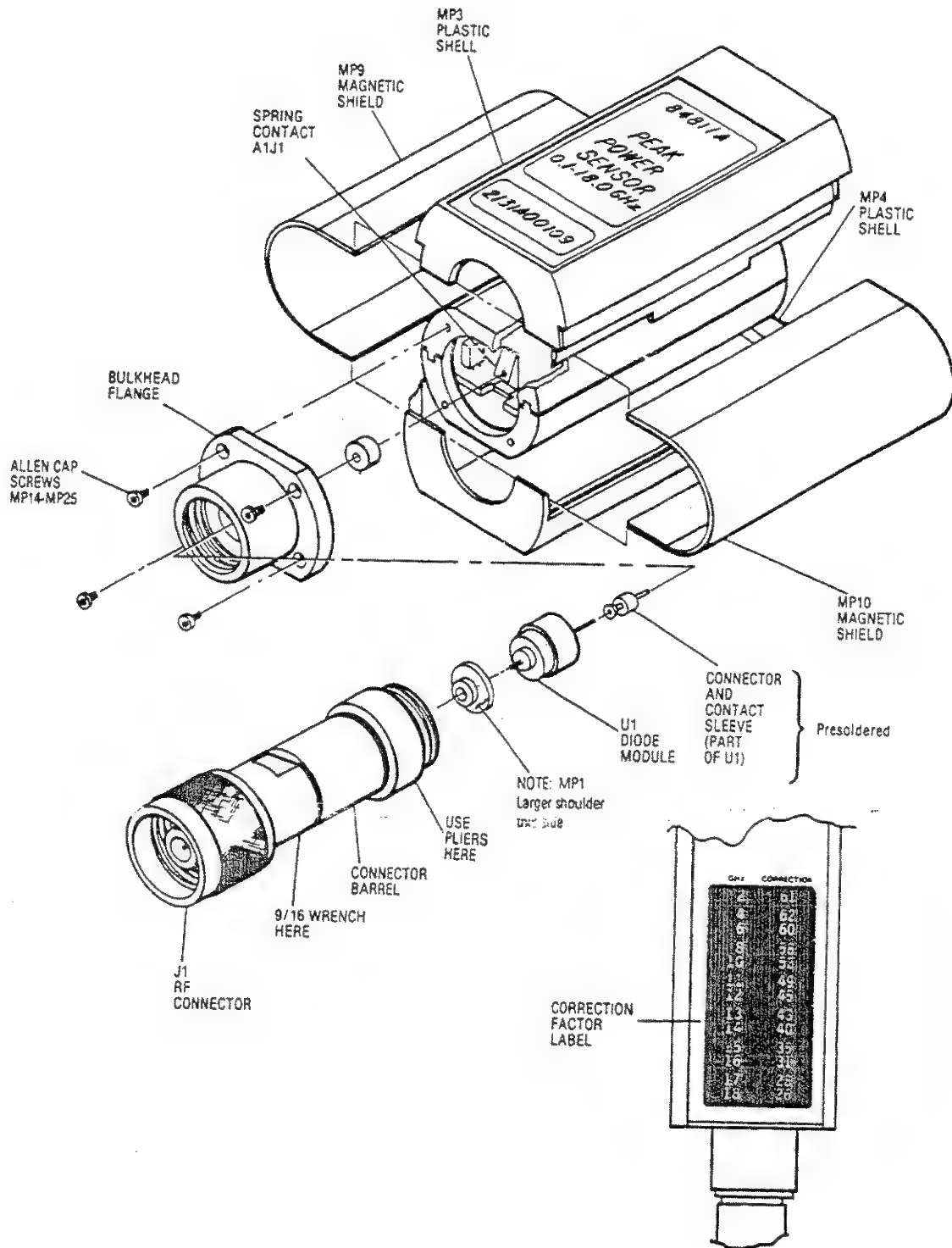


Figure 3. Illustrated Parts Breakdown

## SERVICE

Service instructions consist of principles of operation, troubleshooting, and repairs. Test equipment which meets or exceeds the critical specifications in Table 2 may be used in place of the recommended instruments for troubleshooting the Peak Power Sensor.

### Principles of Operation

For the following discussion, refer to the schematic diagram in Figure 5.

**RF Detector.** The rf signal is applied to the Schottky diode which produces a dc voltage that is proportional to the rf input.

**Input Amplifier (A1).** The main function of the Input Amplifier is to match the diode's output impedance to the 50 $\Omega$  cable W1. The impedance must be matched to reduce ringing caused by any mismatch.

The diode output load helps to flatten the voltage-to-power response of the diode and reduce the effect of temperature variance.

The 20 MHz low pass filter prevents high frequency signals from changing the bias points of the differential amplifier. The differential amplifier has a gain of slightly less than 0.5. Q1 and Q2 amplify the current.

### Troubleshooting

Troubleshooting the HP 84811A Peak Power Sensor consists of checking the amplifier, the detector diode, and the input capacitor. After a repair has been completed, refer to the Peak Power Sensor Performance Test to verify that the instrument meets specifications.

The amplifier circuitry is shown in Figure 5. Figure 4 is the printed circuit locator. To static check the amplifier, perform the following (refer to Figure 1):

1. Insert the blade of a small screwdriver between the two piece plastic shell at the rear of the Peak Power Sensor. Gently pry the two pieces apart. Pry the other side of the shell apart and remove the cover sections. (see Figure 3.)
2. Remove the four Allen screws from the bulkhead flange, then remove the flange and barrel assembly from the instrument.

3. Connect the Sensor to an 8900C/D Peak Power Meter.
4. Apply -1.27 volts to the spring contact (see Figure 3).
5. Check for approximately 100 milliwatts displayed on the 8900C/D. This indicates that the amplifier circuitry is functional.

If the amplifier circuitry is not functional, use Figures 4 and 5 to troubleshoot the Sensor. If the amplifier is functional, the problem is either the detector diode or the input capacitor.

Refer to the Diode Module Replacement Assembly instructions to remove diode U1 from the connector barrel, and to replace the diode. This diode can be tested using a curve tracer set to 5 millivolts and 5 microamps deflection. The origin resistance should be about 1 to 2k Ohms in the forward direction at room temperature.

If the amplifier and the diode are functioning, replace the RF connector assembly J1. This assembly, which includes the input capacitor, can be replaced as follows (refer to Figure 2):

1. Using a 9/16 inch wrench, remove the RF connector from the connector barrel. Use a spanner wrench to hold the connector barrel while removing the connector.
2. Connect the new RF connector to the connector barrel.

### Diode Module Replacement

1. Disconnect the Peak Power Sensor from the Peak Power Meter.
2. Disassemble the Peak Power Sensor by performing the following steps:
  - a. Insert the blade of a small screwdriver between the two piece plastic shell at the rear of the Peak Power Sensor. Gently pry the two pieces apart.
  - b. Proceed to the other side of the connector and again pry the cover sections apart. Remove the shells and the magnetic shields (refer to Figure 5).
  - c. Remove the four Allen cap screws.

- d. Remove the connector bulkhead assembly from the sensor body.
- e. Remove and discard the Caution label on the connector barrel. (A new one is supplied.)
- f. Place the bulkhead flange in a vise.
- g. Using soft-jaw pliers, such as Utica 529-10C, loosen the RF connector assembly by grasping the connector barrel.
- h. Remove the diode module, and associated contacts.
- i. Apply new contacts, supplied presoldered in the replacement kit, to the new diode. Insert the new diode and contacts into the bulkhead.

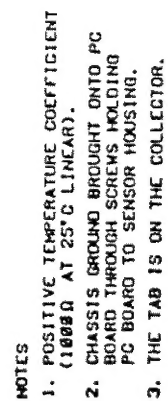
- j. Reassemble by reversing steps a through d, f and g.

**CAUTION**

*The four allen cap screws must not be torqued to greater than 13 in.-ozs. The connector barrel should be torqued to 30 in.-lbs. maximum.*

- k. Apply the new Caution label, in the same location as the label removed in step e.
  - l. Apply the new Correction Factor label, over the existing label.
3. Check for proper operation of the Peak Power Sensor either by use or by performing the Performance Tests in the Operating and Service Manual.





**Figure 5. Peak Power Sensor Schematic Diagram**



## REGIONAL SALES AND SUPPORT OFFICES

For information relating to Sales or Support of Hewlett-Packard products, first contact your local Hewlett-Packard office listed in the white pages of your telephone directory. If none is listed locally, contact Hewlett-Packard at one of the offices listed below to obtain the address or phone number of the Sales or Support office nearest you.

The format for telephone numbers is listed as: (country code/area code or city code) local number. For example, at European Operations HQ, the main site number is listed as: (41/22)780.8111; 41 is the country code, 22 is the city code, and 780.111 is the local number.

### EUROPEAN MULTICOUNTRY

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